

REMARKS

This is in response to the Office Action mailed 07/12/2004. In the Office Action, claims 23-30 and 32-37 were rejected under 35 USC 102(e); claim 31 was rejected under 35 USC 103(a); and the drawing of Figure 1 was objected. Reconsideration of the rejections and objections in view of the amendments and remarks made herein is respectfully requested.

Claims 23-25, 29, 31, and 33 have been amended by this response. Claims 1-22 were previously cancelled without prejudice. No claim has been cancelled by this response. New claims 38-54 have been added. Accordingly, claims 23-54 are now currently pending in this application. Of those pending, claims 23, 29, 33, and 47 are independent claims.

Applicant respectfully submits that no new matter has been added by this response.

I) Drawing Objection and Amendment

The drawing of Figure 1 was objected to for lacking a legend such as "Prior Art". Applicant respectfully traverses this objection.

While Figure 1 is described in the Background Section of the patent application, it is questionable whether or not Figure 1 is actually prior art or just the thought processes of the inventor. Thus, instead of adding "Prior Art" to Figure 1, Applicant has added a legend of --(Background Art)-- to the drawing of Figure 1 under the legend of "FIG. 1".

Appendix I attached hereto is a clean formal drawing of Figure 1 including the added legend of --(Background Art)--.

Appendix II attached hereto is an annotated drawing of Figure 1 indicating this amendment in red.

Applicant respectfully submits that adding this legend to Figure 1 now makes this objection moot and respectfully requests that this drawing objection be withdrawn.

II) Claim Amendments

Applicant has amended claims 23-25, 29, 31, and 33.

Independent claim 23 has been amended to clarify that each of the intrinsic base region and the extrinsic base region have a mono-crystalline portion over a mono-crystalline portion of the substrate. Mono-crystalline is also sometimes referred to as being a single crystal. This is in contrast to poly-crystalline that may also be referred to as having multiple crystals.

Independent claim 23 has been further amended to recite the functionality of the substrate to provide a collector region and introduce the emitter structure from dependent claim 24.

Dependent claims 24-25 have been amended so that the antecedent basis of the emitter structure is in accordance with the amendment to independent claim 23 that now introduces the emitter structure.

Independent claim 29 has been amended to clarify that Applicant's second epitaxial silicon layer has a mono-crystalline portion. Independent claim 29 has been further amended to clarify that the first epitaxial silicon layer also

has a mono-crystalline portion on a mono-crystalline portion of the substrate.

Dependent claim 31 has been amended to delete method limitations and further clarify that the location of the polysilicon emitter is within the emitter window of the nitride layer.

Independent claim 33 has been amended similar to claim 29 to clarify that each of the intrinsic base region and the extrinsic base region have a mono-crystalline portion over a mono-crystalline portion of the substrate.

III) Claim Rejections Under 35 U.S.C. § 102(e)

Claims 23-30 and 32-37 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application No. 2002/0132438 filed by Dunn, et al. ("Dunn"). [Office Action, Pages 2-5]. Applicant respectfully traverses this rejection.

"To anticipate a claim, the reference must teach every element of the claim. 'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegaal Bros. V. Union Oil co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). ... 'The identical invention must be shown in as complete detail as is contained in the claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." [MPEP § 2131, 8th Edition, Rev. 2, May 2004, Pg. 2100-70].

As discussed previously, Applicant has amended independent claims 23, 29, and 33 to clarify Applicant's claimed invention.

Generally with regard to this claim rejection, Applicant respectfully submits that it is difficult to follow as it appears to have been broken up into different pieces. The Applicant has attempted to decipher the allegations raised in the Office Action as best it can. Applicant would greatly appreciate any further claim rejections being set forth more clearly.

Regarding independent claim 29, the Office Action alleges that "Dunn anticipates a bipolar transistor, comprising:

in fig. 26, a substrate having a collector region, the collector 57 region being a collector terminal, under 104,p.4, ¶66;

a first epitaxial silicon layer 58 on a surface of the substrate, p.4,66;

an emitter stack 130 on the first epitaxial silicon layer, the emitter stack being an emitter terminal,p.4,73;

a second epitaxial silicon layer 120 on portions of the first epitaxial silicon layer located outside the emitter stack;"

"better illustrated in fig. 13, wherein a region of the first epitaxial silicon layer located under the emitter stack is an intrinsic base region 58i,p.3,¶54, and a region of the second epitaxial silicon layer on portions of the first epitaxial silicon layer located outside the emitter stack being a raised extrinsic base region, p.4,¶68-69,p.3,¶60;

wherein the raised extrinsic base region has a thickness greater than a thickness of the intrinsic base region, intrinsic

base region between about 500A and about 3000A,p.3,¶54,
extrinsic base region, at least about 1000A,p.4,¶68;"

"and wherein the intrinsic base region and the raised
extrinsic base region provide a base terminal of the bipolar
transistor with lower resistivity,p.1,¶15."

[Office Action, Page 2, last line; Page 3, lines 1-7; Page
4, lines 5-11 and 16-17]. Applicant respectfully disagrees.

Reference number 120 in Dunn refers to Dunn's "wide
superspacers 120". [Dunn, page 4, ¶69]. Apparently Dunn's wide
superspacers 120 are formed using an RIE process on Dunn's
"layer of in-situ doped P+ polysilicon 118" illustrated in
Dunn's Fig. 15. Dunn's layer of in-situ doped P+ polysilicon
118 "is formed by conventional processes and it typically has a
thickness of at least 1000A." [Dunn, page 4, ¶68].

As Dunn's wide superspacers 120 are formed of polysilicon,
a poly-crystalline silicon, they have no mono-crystalline
portion typically associated with an epitaxial layer deposited
on a mono-crystalline substrate. "The epitaxial growth process
is a means of depositing a thin layer (0.5 to 20 um) of single
crystal material upon the surface of a single crystal
substrate." [see Appendix III, *Silicon Processing for the VLSI
Era, Volume 1-Process Technology*, Copyright 1986, Page 124].

Thus, Dunn's wide superspacers 120 do not disclose
Applicant's "second epitaxial silicon layer having a mono-
crystalline portion" as recited in amended claim 29. [Claim 29,
lines 10-11].

Regarding independent claim 23, Applicant respectfully
submits that Dunn does not disclose Applicant's "intrinsic base
region and [the] extrinsic base region [each] having a mono-

crystalline portion over a mono-crystalline portion of the substrate" as recited in amended claim 23. [Claim 23, lines 5-7].

Regarding independent claim 33, Applicant respectfully submits that Dunn does not disclose Applicant's "intrinsic base region and [the] extrinsic base region [each] having a mono-crystalline portion over a mono-crystalline portion of the substrate" as recited in amended claim 33. [Claim 33, lines -7].

For the foregoing reasons, Applicant respectfully submits that Dunn does not anticipate Applicant's amended independent claims 23, 29, and 33.

Rejected dependent claims 24-28 depend directly or indirectly from independent claim 23.

Rejected dependent claims 30-32 depend directly or indirectly from independent claim 29.

Rejected dependent claims 34-37 depend directly or indirectly from independent claim 33.

Applicant believes it has placed independent claims 23, 29, and 33 in condition for allowance such that dependent claims depending respectively there-from with added limitations are also in condition for allowance.

Thus, Applicant respectfully requests the withdrawal of the 35 U.S.C. § 102(e) rejection of claims 23-30 and 32-37 over Dunn.

IV) Claim Rejections Under 35 U.S.C. § 103(a)

On page 5 of the Office Action, claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunn. [Office Action, pages 5-6]. Applicant respectfully traverses this rejection.

The Office Action pointed out a method limitation within claim 31 that was not given patentable weight.

Applicant has amended claim 31 to avoid method limitations and respectfully submits that structural limitations are now recited.

Claim 31 directly depends from independent claim 29 and has additional limitations. The remarks above with respect to independent claim 29 are incorporated here by reference. Applicant has amended independent claim 29 to clarify Applicant's claimed invention.

Applicant believes it has placed independent claim 29 in condition for allowance such that dependent claim 31 dependent respectively there-from with added limitations is also in condition for allowance.

Thus, Applicant respectfully requests the withdrawal of the 35 U.S.C. § 103(a) rejection of claim 31 over Dunn.

V) New Claims

Applicant has added new Claims 38-54.

New claims 38-40 are dependent claims depending directly or indirectly from independent claim 23.

New claims 41-43 are dependent claims depending directly or indirectly from independent claim 29.

New claims 44-46 are dependent claims depending directly from independent claim 33.

Applicant believes that it has placed independent claims 23, 29, and 33 in condition for allowance such that dependent claims 38-40, 41-43, and 44-46 depending there-from with added limitations are also in condition for allowance.

New claim 47 is a new independent claim.

New claims 48-54 are new dependent claims depending directly or indirectly from independent claim 47.

Independent claim 47 recites a "plurality of epitaxial layers [each] having a mono-crystalline portion over the mono-crystalline portion of the substrate". [Claim 47, lines 5-7].

As discussed previously, Dunn's wide superspacers 120 are formed of polysilicon and they have no mono-crystalline portion typically associated with an epitaxial layer.

For the forgoing reasons, Applicant respectfully submits that new claims 47-54 are not anticipated nor made obvious by Dunn and are thus in condition for allowance.

VI) Specification Amendment

Applicant has amended the "Cross Reference to Related Applications" section in order to update the status of the parent patent application as it is now issued. The "Cross Reference to Related Applications" section was added by preliminary amendment upon filing of this divisional patent application on 12/12/2003.

Additionally, Applicant has amended "isotropically" to -- anisotropically-- in paragraph number [0029] to make it consistent with other portions of the specification and the drawings.

The second sentence in paragraph number [0029], previously stated, "In this subsequent step, a thin nitride spacer 132 adjacent to the polysilicon emitter 130 is formed by depositing a layer of silicon nitride 134 having a thickness in the range of 0.01 microns to 0.1 microns and isotropically etching the layers of silicon nitride 134." [Applicant's originally filed specification, page 7, para. 29, lines 3-6].

Isotropically etching of a layer is a non-directional etching of the layer. That is, the layer is etched independent of the direction. The dictionary defines the word isotropic as "Identical in all directions". [Webster's II New College Dictionary, Copyright 1995, page 588, attached hereto as Appendix IV]. As discussed and illustrated in *Silicon Processing for the VLSI Era* by Wolf and Tauber, "[w]hen the etching can proceed in all directions at the same rate, it is said to be isotropic." (For example see Fig. 5b of Wolf and Tauber on page 521) [*Silicon Processing for the VLSI Era*, Volume 1-Process Technology, by Stanley Wolf and Richard N. Tauber, Copyright 1986, page 521, attached hereto as Appendix III].

However the third sentence in paragraph number [0029] states, "In the exemplary method, the silicon nitride layers 120, 134 are **directionally etched** with a plasma etcher." (emphasis added) [Applicant's specification, page 7, para. 29, lines 6-7].

Directionally etching a layer with a plasma etcher is inconsistent with the definition of isotropic etching. Moreover, the drawing of Applicant's Fig. 3E illustrates anisotropic etching (i.e., a directional etching) of the silicon nitride layers 120, 134.

The dictionary defines the word anisotropic as "not isotropic.". [Webster's II New College Dictionary, Copyright 1995, page 45, attached hereto as Appendix IV]. As discussed and illustrated in *Silicon Processing for the VLSI Era* by Wolf and Tauber, "[i]f etching proceeds exclusively in one direction (e.g. only vertically), the etching process is said to be completely anisotropic." (For example see Fig. 5c of Wolf and Tauber on page 521) [*Silicon Processing for the VLSI Era*, Volume 1-Process Technology, by Stanley Wolf and Richard N. Tauber, Copyright 1986, page 521, attached hereto as Appendix III].

Applicant has amended "isotropically" to --anisotropically-- in paragraph number [0029] in order to make it consistent with the figures and the portion of the specification describing a directional etching of the silicon nitride layers 120, 134.

Applicant respectfully submits that amending "isotropically" in the specification in paragraph number [0029] to --anisotropically--, does not constitute adding new matter.

CONCLUSION

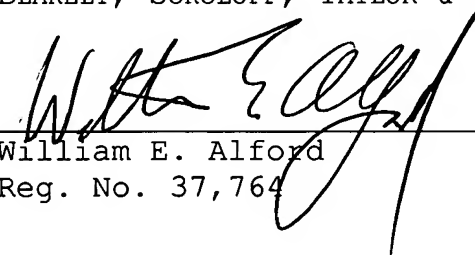
In view of the foregoing it is respectfully submitted that the claims are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance of the claims at an early date is solicited.

The Examiner is invited to contact Applicant's undersigned counsel by telephone at (714) 557-3800 to expedite the prosecution of this case should there be any unresolved matters remaining. To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees in connection with the filing of this paper, including extension of time fees, to Deposit Account 02-2666 and please credit any excess fees to such deposit account.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

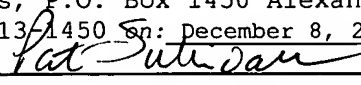
Dated: December 8, 2004



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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450 on: December 8, 2004.



Pat Sullivan

12/8/04

Date

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IN THE DRAWINGS

Figure 1 is amended as follows:

The parenthetical "(Background Art)" has been added below the legend of "FIG. 1".

Appendix I attached hereto is a clean drawing of Figure 1 including the amendment to the legend.

Appendix II attached hereto is an annotated drawing of Figure 1 indicating this change in red.

Appendix II

ANNOTATED DRAWING SHEET TO SHOW AMENDMENT

FIGURE 1

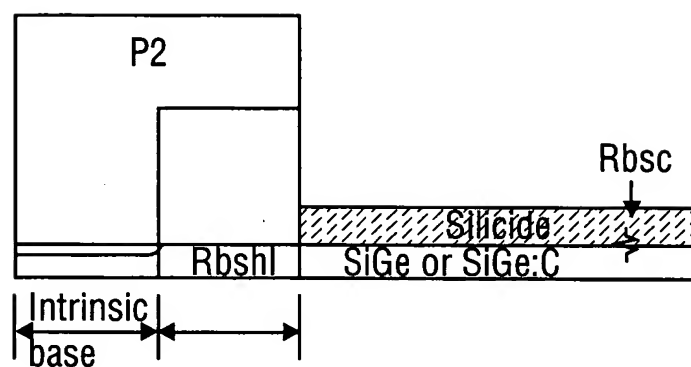


FIG. 1
(Background Art)

Appendix III

Silicon Processing for the VLSI Era, Volume 1-Process Technology
by Stanley Wolf and Richard N. Tauber
Copyright 1986
pages 124, 521

SILICON PROCESSING FOR THE VLSI ERA

VOLUME 1:

PROCESS TECHNOLOGY

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SILICON EPITAXIAL FILM GROWTH

The epitaxial growth process is a means of depositing a thin layer (0.5 to 20 μm) of single crystal material upon the surface of a single crystal substrate. If the film is the same material as the substrate the process is called *homoepitaxy*, but is often referred to as *epitaxy* or simply *epi*. Silicon deposition on a silicon substrate is the most important technological use of homoepitaxy, and is the primary subject of this chapter. If, on the other hand, the deposit is made on a substrate that is chemically different, the process is termed *heteroepitaxy*. This process has found application in the deposition of *silicon on sapphire* (Al_2O_3) which is termed *SOS*. The term *epitaxy* is derived from two Greek words meaning "arranged upon".

Epitaxial growth can be achieved from the vapor phase (VPE), liquid phase (LPE), or solid phase (SPE). For silicon processing, VPE has met with the widest acceptance, since excellent control of the impurity concentration and crystalline perfection can be achieved. Liquid phase deposition has found its widest use in producing epitaxial layers of III-V compounds (e.g. GaAs, InP). Solid phase epitaxy is observed in the crystalline regrowth of ion implanted amorphous layers, as described in the *Annealing Amorphous Layer Damage* section of Chap. 9.

The major impetus for developing silicon epitaxy was to improve the performance of bipolar transistors and later bipolar integrated circuits. By growing a lightly doped epitaxial layer over a heavily doped silicon substrate, the bipolar device could be optimized for high breakdown voltage of the collector-substrate junction, while still maintaining low collector resistance. The low collector resistance provided high device operating speeds at moderate currents. More recently, epitaxial processes have been used in fabricating advanced complementary metal-oxide-silicon (CMOS) VLSI circuits. In these circuits the device is built in a thin (3-7 μm), lightly doped epitaxial layer over a heavily doped substrate. This structure minimizes latch-up effects that a CMOS circuit may undergo when powered-up, or when subjected to a radiation burst. Other advantages of fabricating devices (both bipolar and MOS) in an epitaxial layer are that the doping concentration of the device can be accurately controlled, and that the layer can be made oxygen and carbon free. The epitaxial process however is not without its disadvantages. These include: a) increased processing complexity and wafer costs; b) defect generation in the epitaxial layer; c) autodoping; and d) pattern shift and washout.

In this chapter we present: a) the fundamentals of epitaxial deposition; b) doping in epitaxial films; c) defects in epitaxial films; d) process considerations for VLSI epitaxial depositions; e) epitaxial deposition equipment; f) the characterization of epitaxial films; g) selective deposition of epitaxial silicon; and h) molecular beam epitaxy of silicon.

Fig. 1

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material which is not covered by the mask (Fig. 5). In this section we will discuss the terms used to describe the basic aspects of etch processes.

Bias, Tolerance, Etch Rate, and Anisotropy

In general an ideal etch process is not completely attainable. That is, the etching processes are not capable of precisely transferring the pattern established by the protective mask into the underlying material. The degree to which the process fails to satisfy the ideal is specified by two parameters: *bias* and *tolerance*. As shown in Fig. 6d, *bias* is the difference in lateral dimension between the etched image and the mask image. *Tolerance* is a measure of the statistical distribution of bias values that characterizes the uniformity of etching. The tolerance parameter can be specified for a single wafer (bias distribution across a wafer), for an entire lot (bias distribution throughout the lot) or from run-to-run (bias distribution across a group of runs).

The rate at which material is removed from the film by etching is known as the *etch rate*. The units of etch rate are typically expressed in Å/sec, μm/min, etc. Generally, high etch rates are desirable as they allow higher production throughputs, but in some cases high etch rates make control of lateral etching a problem. That is, since material removal can occur in both the horizontal and vertical directions, the *horizontal etch rate* as well as the *vertical etch rate* may need to be established in order to characterize an etch process. Normally the uniformity of these etch rates is also of interest, and is expressed for three conditions (across a wafer, from wafer-to-wafer, and from run-to-run), as *etch rate % uniformity*, according to:

$$\text{Etch Rate Percent Uniformity} = \frac{(\text{Etch Rate}_{\text{high}} - \text{Etch Rate}_{\text{low}})}{(\text{Etch Rate}_{\text{high}} + \text{Etch Rate}_{\text{low}})} \times 100\% \quad (1)$$

Highly uniform etch rates are almost always desirable in an etch process.

The lateral etch ratio, L_R , is defined as the ratio of the etch rate in a horizontal direction to

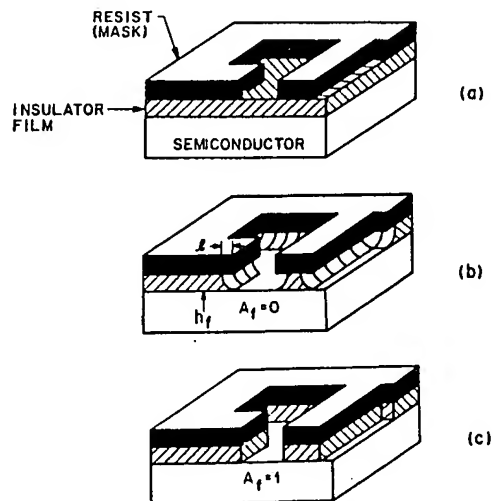


Fig. 5 Comparison of (b) isotropic, and (c) completely anisotropic etching. From E.C. Douglas, *Solid State Technol.*, 24, 65, (1981). Reprinted with permission of Solid State Technology, published by Technical Publishing, a company of Dun & Bradstreet.

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Appendix IV

Webster's II New College Dictionary
Copyright 1995
Pages 45, 588

Webster's II

New College Dictionary

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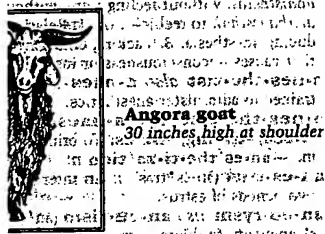
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General vocab

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bit, sometimes blended with wool in fabric from either of these fibers. 2. An Angora rabbit. 3. A breed of domestic goat with long, silky hair. 4. A breed of domestic goat with long, silky hair.



Angora goat
30 inches high at shoulder

Angora rabbit *n.* A breed of domestic rabbit with long, soft hair.

Angry *adj.* 1. Indicative of or resulting from having a menacing or threatening aspect. 2. As a sore. — **an'grily** *adv.*

Angry Young Man *n.* One of a group of poets whose work reflects social protest.

Anguish *n.* 1. A state of intense suffering or distress. 2. A state of intense suffering or distress.

Angular *adj.* 1. Having angles or an angular shape. 2. Having angles or an angular shape.

Angular velocity *n.* 1. The rate of change of angular velocity. 2. The rate of change of angular velocity.

Angular momentum *n.* 1. The quantity of motion. 2. The quantity of motion.

Angular displacement *n.* 1. The angle through which a body has turned. 2. The angle through which a body has turned.

Angular distance *n.* 1. The angle between two lines. 2. The angle between two lines.

Angular measurement *n.* 1. The measurement of angles. 2. The measurement of angles.

Angular instrument *n.* 1. A device for measuring angles. 2. A device for measuring angles.

to make rubber, dyes, resins, pharmaceuticals, and varnishes. — **adj.** Derived from aniline.

Aniline black *n.* A black dye that is produced on a fiber such as cotton by oxidation of aniline oil and is noted for its color intensity, fastness, and resistance to greening.

Aniline dye *n.* Any of numerous synthetic dyes, of which aniline black is the most common.

Ani-mad-ver-sion (an'ə-mād-vū'zhən, -shən) *n.* [Lat. *animadversio* < *animadvertere*, to turn the mind toward: see ANIMADVERT.] 1. Hostile criticism. 2. A severely critical or censorious remark.

Ani-mad-vert (an'ə-mād-vū't) *vt.* **-vert-ed**, **-vert-ing**, **-verts**. [Lat. *animadvertere*, to turn the mind toward: *animus*, mind; *vertere*, to turn.] To remark or comment critically, usu. with strong disapproval.

Ani-mal (an'ə-māl) *n.* [Lat. < *animalis*, living < *anima*, soul.] 1. A multicellular organism of the kingdom Animalia, characterized by the capacity for locomotion, fixed bodily structure, and restricted growth, nonphotosynthetic metabolism, and an ability to recognize and respond to stimuli. 2. An animal organism other than a human being.

Animal *adj.* 1. Of, relating to, or typical of animals. 2. Relating to the physical or nonrational as distinct from the spiritual nature of humans.

Animal crackers *pl. n.* Small cookies in various animal shapes.

Ani-mal-cu-lum (an'ə-māl'kyū-lŭm) *n.* [Lat. *animalculum*, dim. of *Lat. animal*; *animal*, 1. A microscopic or minute organism, as an amoeba or paramecium, usu. regarded as an animal. 2. Archaic. A tiny animal; as a mosquito.

Animal heat *n.* Heat generated in an animal's body.

Animal husbandry *n.* The care and breeding of domestic animals, as cattle, hogs, sheep, and horses.

Animalism (an'ə-māl-izm) *n.* 1. A state of enjoying good health and vigorous physical drives. 2. A state of indifference to all but the physical appetites. 3. The doctrine that the human being is purely animal with no spiritual nature.

Animal-ize (an'ə-māl-īz) *vt.* **-ized**, **-iz-ing**, **-izes**. 1. To make coarse and brutal. 2. To endow (a deity) with the attributes of an animal. — **an'i-mal-iz-a-tion** *n.*

Animal kingdom *n.* The category of living organisms that includes all animals.

Animal magnetism *n.* 1. Hypnotism or mesmerism. 2. Magnetic personal presence. 3. Sensualism. 4. Christian Science. — Used to refer to "The voluntary or involuntary action of error in all its forms" — Mary Baker Eddy.

Animal spirits *pl. n.* Vigorous buoyancy of good health.

Animal starch *n.* Glycogen.

Ani-mate (an'ə-māt) *vt.* **-mat-ed**, **-mat-ing**, **-mates**. [Lat. *animare*, *animat* < *anima*, soul.] 1. To give life to. 2. To impart interest or zest to: ENLIVEN < "The party was animated by all kinds of men and women" — René Dubos. 3. To impart spirit, courage, or resolution to: ENCOURAGE. 4. To inspire to action: PROMPT. 5. To impart motion or activity to. 6. To make, design, or produce (e.g., a cartoon) so as to create the illusion of motion. — **adj.** (an'ə-māt) 1. Having life. 2. Alive. 2. Of or relating to animal life as distinct from plant life. 3. Belonging to the class of nouns that stand for living things, e.g., the word "cat" is animate, the word "house" is inanimate.

Ani-mat-ed (an'ə-māt) *adj.* 1. Filled with life, activity, vigor, or spirit. 2. Made or designed so as to seem alive and moving. 3. Containing or made of figures or objects that seem to move in a lifelike manner. — **an'i-mat-ed-ly** *adv.*

Animated cartoon *n.* A usu. short motion picture having a photographed series of drawings.

Animated oat *n.* A Mediterranean grass, *Avena sterilis*, bearing spikelets that move in response to changes in moisture.

Ani-mat-er (an'ə-māt'ər) *n.* *var.* of ANIMATOR.

Ani-ma-tion (an'ə-mā'shən) *n.* 1. The act, process, or result of animating. 2. The quality or condition of being animate. 3. a. The art or process of designing, preparing, or producing animated cartoons or feature-length films. b. An animated cartoon.

Ani-ma-to (ā'nē-mā'tō) *adv.* & *adj.* [Ital. < Lat. *animatus*, p.prt. of *animare*, to animate.] *Mus.* In an animated or lively manner.

Ani-ma-tor also **ani-mat-er** (an'ə-māt'ər) *n.* 1. One that animates. 2. One who designs, prepares, or produces an animated cartoon or feature-length film.

Ani-mism (an'ə-mīz-əm) *n.* [G. *Animismus*; Lat. *anima*, soul; *-ismus*, -ism.] 1. A primitive belief whereby natural phenomena and animate and inanimate things are held to possess an innate soul. 2. A theory of psychic concepts or of spiritual beings. 3. The hypothesis,

first advanced by Pythagoras and Plato, of an immaterial force animating the universe. 4. An 18th-cent. doctrine that viewed the soul as the vital principle and source of both the normal and the abnormal phenomena of life.

Ani-mos-i-ty (an'ə-mōs'ī-tē) *n.* *pl.* **-ties**. [ME *animositē* < OFr. < Llat. *animositas*, courage < Lat. *animosus*, bold < *animus*, soul.] Long-standing or deep-seated hostility: ENMITY.

Ani-mus (an'ə-məs) *n.* [Lat.; soul; mind.] 1. An animating intention or purpose. 2. A feeling of animosity: ILL WILL.

Ani-on (an'ī-ŏn) *n.* [Gk.; (something) going up, p.prt. of *anienai*, to go up; *ana*, up + *ienai*, to go.] A negatively charged ion that migrates to an anode, as in electrolysis.

Ani-o *pref.* *var.* of ANISO-; as in *anisole*, *anisotropic*.

Ani-se (an'ī-sē) *n.* [ME *anis* < OFr. < Lat. *anison* < Gk. *anison*.] 1. A plant native to the Mediterranean region, *Pimpinella anisum*, with small, yellowish-white flower clusters and licorice-flavored seeds. 2. Aniseed.

Ani-seed (an'ī-sēd) *n.* [ME *anis seed*, anise seed.] The licorice-flavored seed of the anise plant, used medicinally and as a flavoring.

Ani-sei-ko-ni-a (an'ī-sē-kō-nē-ə) *n.* [NLat. < ANIS(O) + Gk. *eikōn*, image.] An ocular defect in which image, shape, and size differ in each eye.

Ani-sette (an'ī-sēt) *n.* [Fr. dim. of *anis*, anise < OFr.] An anise-flavored liqueur.

Ani-so or **anis-** *pref.* [NLat. < Gk. *anisos*, unequal; *an-*, not + *isos*, equal.] Unequal; dissimilar [*anisogamy*].

Ani-sog-a-my (an'ī-sōg'ə-mē) *n.* A union between markedly different gametes. — **an'ī-sō-gam'ic** *adj.*

Ani-som-er-ous (an'ī-sōm'ə-rəs) *adj.* Having or designating floral whorls that have unequal numbers of parts.

Ani-so-met-ric (an'ī-sō-mēt'rik) *adj.* Not isotropic.

Ani-so-me-trop-ic (an'ī-sō-mē-trōp'ik) *n.* [ANISO- + Gk. *metros*, measure + *-opia*, Difference in the refractive power of the eyes.

Ani-sot-rop-ic (an'ī-sō-trōp'ik) *adj.* 1. Not isotropic. 2. Physics. Having properties that differ according to the direction of measurement. — **an'ī-sō-trōp'i-cal-ly** *adv.* — **an'ī-sōt'ro-pism** (sōt'ro-plz-əm), **an'ī-sōt'ro-py** (sōt'ro-pē) *n.*

An-ker-ite (ang'kə-rīt) *n.* [C. Anker, after M.] Anker (d. 1843.) A dolomite-like mineral in which iron partially replaces magnesium.

Ankh (angk) *n.* [Of Egypt; orig.] An anate cross.

An-kle (angk'kəl) *n.* [ME *ancle*, prob. of ON orig.] 1. The joint that connects the foot with the leg. 2. The slender section of the leg just above the foot.

An-kle-bone (angk'kəl-bōn) *n.* The talus.

An-klet (angk'klet) *n.* 1. An ornament worn about the ankle. 2. A sock reaching just above the ankle.

An-ky-lose also **an-chy-lose** (angk'kə-lōs'ə-lōz'ə) *v.* **-lo-sed**, **-lo-sing**, **-lo-ses**. [Back-formation < ANKYLOSIS.] *vt.* To join or stiffen by ankylosis. — *vi.* To undergo ankylosis.

An-ky-lo-sis also **an-chy-lo-sis** (angk'kə-lō'sis) *n.* [NLat. < Gk. *ankulosis*, stiffening of the joints < *ankuloun*, bent.] 1. Anat. The consolidation of bones or their parts forming a single unit. 2. Pathol. The stiffening of a joint due to abnormal bone fusion.

An-lace (an'lē-s) *n.* [ME *anelas*] A two-edged medieval dagger.

An-la-ge also **An-la-ge** (an'lē-gə) *n.* *pl.* **-ges** or **-gen** (gən) [Gk., fundamental principle < MHG *anlāge*, request: *an-*, on + *lāge*, act of laying.] 1. The initial cell structure from which an embryonic part or organ develops: PRIMORDIUM. 2. A fundamental principle.

An-na (ā'nə) *n.* [Hindi *ānā* < Skt. *anu*, small.] A copper coin once used in India and Pakistan.

An-nal-ist (an'ə-līst) *n.* One who writes annals: CHRONICLER.

An-nals (an'ə-lz) *pl. n.* [Lat. (*libri*) *annales*, yearly (books) < *annalis*, yearly < *annus*, year.] 1. A chronological record of the events of successive years. 2. Chronicles. 3. A periodical compiling the records and reports of an organization or a learned field.

An-na-mese (an'ə-mēz'ə-mēs') also **An-na-mite** (an'ə-mīt') *adj.* Of or relating to Annam; its inhabitants, their language, or their culture. — *n.* *pl.* **Annamese** also **-mites**: A native or inhabitant of Annam. 2. Vietnamese.

An-nat-to (ə-nā'tō) also **ar-nat-to** (ār-nā'tō) *n.* *pl.* **-tos**. [Of Caribbean orig.] 1. A small tropical American tree, *Bixa orellana*, with red or pinkish flowers and seeds used in cooking. 2. A yellowish-red dye stuff obtained from the pulp of annatto seeds.

An-neal (ə-nē'l) *vt.* **-nealed**, **-neal-ing**, **-neals**. [ME *anelen* < OE *anelan*, to set fire to: *an*, on + *elan*, to kindle < *āl*, fire.] 1. To subject (glass or metal) to heat and slow cooling so as to toughen and reduce brittleness. 2. To temper.

An-ne-lid (an'ə-līd) also **an-nel-i-dan** (ə-nē'l'ī-dən) [NLat. *Annelida*, phylum name < Fr. *annelé*, ringed < OFr. *annel*, ring < Lat. *anellus*, dim. of *anulus*, ring.] *adj.* Of or belonging to the phylum Annelida, which includes worms having cylindrical segmented bodies, as the earthworms and leeches. — *n.* An annelid worm.

An-nex (ə-nēks') *vt.* **-nexed**, **-nex-ing**, **-nex-es**. [ME *annexen* < OFr. *annexer* < Lat. *annexus*, p.prt. of *annectere*, to connect: *ad-*, to + *nectere*, to bind.] 1. To append or attach; esp. to a larger or more significant entity. 2. To incorporate (territory) into an existing

i-soch-ro-nal (i-sôk'ra-nal) *adj.* [*< Gk. isokhronos: isos, equal + khronos, time.*] 1. Equal in duration. 2. Marked by or occurring at equal time intervals. — **i-soch-ro-nal-ly** *adv.* — **i-soch-ro-nism** *n.*

i-soch-ro-nize (i-sôk'ra-niz') *vt.* -nized, -niz-ing, -niz-es. To make isochronal.

i-soch-ro-nous (i-sôk'ra-nas) *adj.* Isochronal.

i-soch-ro-ous (i-sôk'rô-as) *adj.* [iso- + *Gk. khros, flesh, color.*] Having the same color throughout.

i-so-cli-nal (i'sô-kli'nal) *adj.* Having the same dip or inclination. — *n.* An isoclinic line. — **i-so-cli-nal-ly** *adv.*

i-so-cline (i'sô-klin') *n.* An anticline or syncline with strata so tightly folded as to have the same dip.

i-so-clin-ic (i'sô-klin'ik) *adj.* *cl.* n. Isoclinic.

isoclinic line *n.* A line on a map connecting points of equal magnetic dip.

i-so-di-a-met-ric (i'sô-di'a-met'rik) *adj.* Having equal diameters.

i-so-di-mor-phism (i'sô-di-môr'fiz'am) *n.* Isomorphism between crystalline forms of two dimorphic substances.

i-so-dy-nam-ic (i'sô-di-nâm'ik) *adj.* Having equal strength or force.

i-so-e-lec-tric (i'sô-i-lék'trik) *adj.* Having equal electric potential.

i-so-e-lec-tron-ic (i'sô-i-lék-trôn'ik) *adj.* Having equal numbers of electrons or the same electronic configuration.

i-so-en-zy-me (i'sô-en'zim') *n.* One of two or more chemically distinct but functionally identical forms of an enzyme. — **i'so-en-zy-mic** *adj.*

i-so-ga-mete (i'sô-ga-met', -gâm'et') *n.* A gamete morphologically indistinguishable from one with which it unites.

i-sog-a-my (i-sôg'a-mê) *n.* Conjugation of isogametes or of identical cells. — **i-sog-a-mous** *adj.*

i-sog-ness (i'sô-glôs', -glôs') *n.* [iso- + *Gk. glossa, language.*] A geographic boundary delimiting the area in which a given linguistic form occurs. — **i'so-gloss'al** *adj.*

i-so-gon (i'sô-gôn') *n.* An equiangular polygon.

i-so-gon-ic (i'sô-gôn'ik) *also* **i-sog-o-nal** (i-sôg'a-nal) *adj.* Having equal angles. — *n.* An isogonic line.

isogonic line *n.* A line on a map connecting points of equal magnetic declination.

i-so-gram (i'sô-grâm') *n.* A line on a map, chart, or graph connecting points of equal value.

i-so-hel (i'sô-hél') *n.* [iso- + *Gk. helios, sun.*] A line on a map connecting points receiving equal sunlight.

i-so-he-mo-ly-sin (i'sô-hê-ma-lî'sen, -hêm'ô-, -hî-môl'î-sin) *n.* Hemolysin derived from the serum of an individual injected with red blood cells from another individual of the same species.

i-so-he-mo-ly-sis (i'sô-hê-môl'î-sis) *n.* Hemolysis due to the action of isohemolysin.

i-so-hy-et (i'sô-hî'ti) *n.* [iso- + *Gk. huetos, rain.*] A line on a map connecting points receiving equal rainfall.

i-so-late (i'sô-lât') *vt.* -lat-ed, -lat-ing, -lates. [Back-formation *< isolated, set apart < Fr. isolé < Ital. isolato < LLat. insulatus, made into an island < insula, island.*] 1. To set apart from a group or whole. 2. To place in quarantine. 3. *Chem.* To obtain (a substance) in an uncombined form. 4. To render free of external influence: *INSULATE*. — *adj.* (-lât', -lât'). Solitary; alone. — **i'so-la-ble** (-lâ-bəl), **i'so-lat'a-ble** (-lât'â-bəl) *adj.* — **i'so-la-tion** *n.* — **i'so-la-tor** *n.*

i-so-la-tion-ism (i'sô-lâ-sha-nîz'am) *n.* A national policy of abstaining from economic or political entanglements with other countries. — **i'so-la-tion-ist** *n.*

I-sol-de (i-sôl'da, i-zôl') *n.* *var. of* *ISEULT*.

i-so-lec-i-thal (i'sô-lê's'a-thal) *adj.* [iso- + *LECITH(IN) + -AL*.] Having the yolk evenly distributed throughout the egg.

i-so-leu-cine (i'sô-lôô'sên') *n.* An essential amino acid, C₆H₁₃NO₂, isomeric with leucine.

i-so-mag-net-ic (i'sô-mâg-net'ik) *adj.* Designating or relating to points of equal magnetic induction.

i-so-mer (i'sô-mar) *n.* 1. *Chem.* a. A compound with the same percentage composition and molecular weight as another compound but differing in chemical or physical properties. b. Such a compound so differing because of the manner of linkage of its constituent atoms. c. Such a compound so differing because of the manner of arrangement of its constituent atoms in space. d. A stereoisomer manifesting one of two structures that rotate the plane of polarization of polarized light either to the left or to the right. e. A stereoisomer having no effect on polarized light but exhibiting isomerism because of a structural asymmetry about a double bond in the molecule. 2. *Physic.* An atom the nucleus of which can exist in any of several bound excited states for a measurable period of time. — **i'so-mer-ic** (i-met'ik) *adj.*

i-so-mer-ase (i-sôm'a-räs') *n.* An enzyme that catalyzes isomerization reactions.

i-som-er-ism (i-sôm'a-rîz'am) *n.* 1. The phenomenon of the existence of isomers. 2. The complex of chemical and physical phenomena typical of or attributable to isomers. 3. The condition of being an isomer.

i-som-er-ize (i-sôm'a-rîz') *vi.* *cl.* *vt.* -ized, -iz-ing, -iz-es. To change or cause to change into an isomeric form. — **i-som-er-iza-tion** *n.*

i-som-er-ous (i-sôm'ar-as) *adj.* 1. Having an equal number of parts, as organs or markings. 2. Having or designating floral whorls with equal numbers of parts.

i-so-met-ric (i'sô-met'rik) *also* **i-so-met-ri-cal** (-ri-kal) *adj.* [*< Gk. isometros, of equal measure: isos, equal + metron, measure.*] 1. Of or exhibiting equality in measurements or dimensions. 2. Of or being a crystal system of three equal and mutually orthogonal axes. 3. *Physiol.* Of or involving muscular contraction against resistance without significant shortening of the muscle with the result of increased muscle tone. — *n.* **isometric**. 1. A line connecting isometric points. 2. **isometrics**. (*sing. in number*). Isometric exercise.

isometric exercise *n.* Exercise involving isometric contraction.

i-so-me-tro-pi-a (i'sô-mê-trô'pê-a) *n.* [*Gk. isometros, isometric + -OPIA*.] Equality of refraction in both eyes.

i-som-e-try (i-sôm'i-trê) *n.* 1. Equality of measure. 2. Equality of elevation above sea level.

i-so-morph (i'sô-môr'f) *n.* An object, organism, or group displaying isomorphism.

i-so-mor-phic (i'sô-môr'fik) *adj.* 1. Being of identical or similar form, shape, or structure. 2. Related by an isomorphism.

i-so-mor-phism (i'sô-môr'fiz'am) *n.* 1. *Biol.* Similarity in form, as in organisms of different ancestry. 2. *Math.* a. A one-to-one correspondence between the elements of two sets such that the result of an operation on elements of one set corresponds to the result of the analogous operation on their images in the other set. b. A mapping f of a group G onto another group H such that $(ab)^* = (a^*)(b^*)$ for all a, b in G . 3. The existence or an instance of the existence of two or more different substances with closely similar crystalline structure and chemical composition. — **i'so-mor-phous** *adj.*

i-so-ni-a-zid (i'sô-nî'a-zîd) *n.* [ISONI(COTINIC ACID) + (HYDRA)ZID(e)]. A crystalline compound, C₁₂H₁₄N₄O₂, used for treating tuberculosis.

i-so-oct-ane (i'sô-ôk'tân') *n.* A highly flammable liquid, C₈H₁₈, used to determine the octane numbers of fuels.

i-so-pi-es-tic (i'sô-pî-ês'tik, -pê-) *adj.* [iso- + *Gk. piestos, able to be compressed < piezein, to press tight.*] Characterized by or registering equal pressure: *ISOBARIC*. — *n.* *AN ISOBAR*.

i-so-pod (i'sô-pôd') *n.* [*NLat. Isopoda, order name: iso- + Gk. pous, foot.*] Any of various crustaceans of the order Isopoda, which includes the sow bugs and griddles. — **i'so-pod'ly** *adj.*

i-so-pre-ne (i'sô-prên') *n.* [iso- + *PR(OPYL) + -ENE*.] A colorless volatile liquid, C₈H₁₆, used primarily in making synthetic rubber.

i-so-prop-yl alcohol (i'sô-prô'pal) *n.* A clear, colorless, flammable, mobile liquid, C₃H₈O, used in antifreeze compounds, lotions, and cosmetics and as a solvent for shellac, gums, and essential oils.

i-sos-ce-les (i-sôs'pê-lêz') *adj.* [*LLat. isosceles < Gk. isoskelês: isos, equal + skelos, leg.*] Having two equal sides.

i-so-seis-mic (i'sô-sîz'mik) *also* **i-so-seis-mal** (-mal) *adj.* Of, relating to, or exhibiting equal seismic intensities.

i-sos-mot-ic (i'sôz-môt'ik, -sôs-) *adj.* Of or exhibiting equal osmotic pressure.

i-so-spin (i'sô-spîn') *n.* [iso(TOPIC) + *SPIN*.] A quantum number related to the number of charge states of a subatomic particle such as a baryon or meson.

i-sos-ta-sy (i-sôs'tâ-sê) *n.* [iso- + *Gk. stasis, a standstill.*] Equilibrium caused by isotropic equalization of pressure.

i-so-therm (i'sô-thûrm') *n.* [*Fr. isotherme, having the same temperature: Gk. isos, equal + Gk. thermê, heat.*] A line on a weather map or chart linking all points having identical mean temperature for a specified period or identical temperature at a specified time.

i-so-ther-mal (i'sô-thûr'mal) *adj.* 1. Of, relating to, or registering equal temperatures. 2. Of or designating changes of pressure and volume at constant temperature. 3. Of or relating to an isotherm. — *n.* An isotherm.

i-so-tone (i'sô-tôn') *n.* [iso- + *Gk. tonos, tension, stretching.*] One of two or more atoms whose nuclei have the same number of neutrons but different numbers of protons.

i-so-ton-ic (i'sô-tôn'ik) *adj.* [iso- + *Gk. tonos, tension.*] 1. Equal in tension. 2. *Isosmotic*. — **i'so-ton'i-cal-ly** *adv.* — **i'so-to-nic-i-ty** (-tô-nîs'î-tê) *n.*

i-so-tope (i'sô-tôp') *n.* [iso- + *Gk. topos, place.*] One of two or more atoms whose nuclei have the same number of protons but different numbers of neutrons. — **i'so-top'ic** (-tôp'ik) *adj.* — **i'so-top'i-cal-ly** *adv.*

isotopic spin *n.* Isospin.

i-so-tro-pic (i'sô-trô'pik, -trôp'ik) *adj.* Identical in all directions: — **i-sot'ro-py** (i-sôt'rô'pê), **i-sot'ro-pism** (-plz'am) *n.*

i-so-zy-me (i'sô-zîm') *n.* [iso- + (EN)ZYME.] Isoenzyme.

Is-ra-el (îz'rê-əl) *n.* [*Lat. < Gk. Israël < Heb. Yisrâ'el.*] 1. Jacob. 2. The descendants of Jacob. 3. The Hebrew people, regarded as the chosen people of God by virtue of the covenant of Jacob.

Is-rae-li (îz-râ-lê) *adj.* Of or relating to the state of Israel or its people. — *n., pl.* *Israeli or -lis.* A native or resident of the state of Israel.

Is-ra-el-ite (îz'rê-əl'it) *n.* 1. A native or inhabitant of ancient Is-

rael. 2. A descendant of Jacob. — *adj.* *lit'ik*. Of or relating to Israel or the *Is-sa-char* (îs'â-kâr') *n.* [*LLat. < Gk. Is-sa-char (îs'sâ') n., pl. Issai or -seis (Mandarin) yi' shi' : yi', first + shi', grant to the United States or Canada.*]

is-su-a-ble (îsh'ô-â-bəl) *adj.* 1. Capable of being issued. 2. Open to debate or litigation. 3. Available for issue.

is-su-ance (îsh'ô-âns) *n.* An act of issuing.

is-su-ant (îsh'ô-ânt) *adj.* 1. Archai-ignating an animal with only the upper lip. 2. *Is-sue* (îsh'ô) *n.* [ME] exit, act of going out. 3. *Lat. exitus, p.p. of exire, to go out* act or instance of passing, flowing, or lating, distributing, or publishing by something produced, published, or of items, as stamps, made available at one place. 4. A single copy of a periodical. 5. A set of distinguished from others of that edit-matter. 6. A final result or outcome. 7. f. Something proceeding from a desig- the issue of a creative mind. 8. Offs- debate, discussion, or dispute. 9. A m- essential point : *crux*. 10. A culmi- nant point. 11. A discharge, as of blood. 12. Termination : close. — *v.* -sued, -sue- come out. 2. To accrue as profit or pr- scended. 4. To be published or circu- 6. To result in or terminate. — *vt.* 1. To 2. To distribute or circulate official- 3. To publish. — *at issue*. 1. In que- — *take issue*. To take an opposing p- suer *n.*

-ist *suffix*. [ME *-iste < OFr. < Lat. -is* suffix.] 1. a. One that performs a given produces, makes, operates, plays, or i- <novelist>. 2. A specialist in a given a- 3. An adherent or advocate of a give- thought <anarchist>. 4. One that is a quality <romanticist>.

isth-mi (îs'mî') *n.* *var. pl. of* *ISTHMI*.

isthm-i-an (îs'mê-an) *adj.* 1. Of, rel- 2. *Isthmian*. Of or relating to the Is- gard to the biennial pan-Hellenic game.

isth-mus (îs'mas) *n.; pl. -mus-es* (-thmos). 1. A narrow strip of land con- 2. *Anat. a.* A narrow strip of tissue be- of an organ. b. A narrow passage con- *isth-mus* *also* *isth-mus* (îs'lê, îst'-) *n.* [fibrous stem.] A plant, pita, or its fib- it (îs'th-mus) [ME < OE *hit*.] 1. That on as the subject, direct object, indirect for a nonhuman entity, an animate be sex is unknown, unspecified, or irrel- viduals, or an abstraction. <scrubbe- <couldn't figure out what it was> <son> <gave it a thorough examination impersonal verb <it is pouring outsi- patory subject <it is known who will anticipatory subject to emphasize a te- was on Tuesday that the fire occurred condition or state of affairs <couldn't refer to something that is the best equal <That performance was really tag, who tries to find or catch the ot it's a col-u-mite (îs'â-kôl'yô-mîr') in Brazil where it is found. A vari- when cut into thin slabs.

I-tal-ian (î-tâl'yân) *adj.* [ME < *Lat. ing to Italy, its people, or their langu- of Italy or a person of Italian descent, and one of the three official languag- I-tal-ian-ate* (î-tâl'yân-â-tê) *adj.* a **I-tal-ian-ism** (î-tâl'yân-îz'm) *n.* : pression. 2. A quality typical of Italy **I-tal-ian-ize** (î-tâl'yân-îz') *v.* -iz- give an Italian aspect to. — *vi.* To a customs. — **I-tal-ian-iza-tion** *n.* **HERO-5.** **Italian sonnet** *n.* A Petrarchan s- **I-tal-ic** (î-tâl'ik, î-tâl'y-) *adj.* [*Lat. Italy < Lat.*] 1. Of or relating to anc-

â pat' â pay âr care, â father, ît pet ît be hw which ît pit
i tie îr pier ô pot ô toe ô paw, for oi noise ôo took

ôo boot ou out th thin, th th
yôo abuse zh vision a about, i